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ARCHÆOLOGY

Ruins Show How Crusaders Lived in Palestine

By Emily C. Davis

How would you like to explore a crusaders' fortress in Palestine—to go searching among the ruins for clues to the knights who fought to take Jerusalem and the tomb of Christ away from the infidel? Strange to say, this alluring adventure of making a Palestine castle give up its buried secrets has never been attempted until now.

Now, 600 years after its last siege, one of the most formidable of the castles has been attacked by an expedition from the Metropolitan Museum of Art, assisted by a little army of native workmen armed with picks, shovels, and baskets. As a result of one month's intensive operations, this expedition has unearthed objects that make the armored knights of the thirteenth century seem more real, just as the kings of Egypt, Ur, and Babylon have become everyday human beings through the efforts of science.

This new venture into a buried past was planned and arranged by Dr. Bashford Dean, curator of armor at the Metropolitan Museum. For years Dr. Dean has studied and loved armor, and under his guidance the Metropolitan's collection has become the finest in the world. But there has always been a conspicuous gap between the scale armor worn by the fighting Franks, and the marvelously wrought suits of plate worn by noblemen of the fifteenth century. The great armor hall is thronged with figures of the fifteenth and sixteenth centuries in full tournament or siege armor, standing in ranks under their banners. But their thirteenth century ancestors, who fought the Turk in chain mail and wore helmets shaped like large square cans, are entirely absent.

The scarcity of even fragments of this armor is due to the fact that the crusaders' age was strenuous and semi-barbaric, Dr. Dean explains. A knight's spurs might be buried with him, because they were the token of his knighthood, but his coat of chain mail and his other trappings of a fighter's trade were handed on from one member of a family to another. When they became torn or shapeless, they went to an armor workshop, to be retailored, so to speak. And finally they were melted up for the valuable metal they contained. Any pieces that found theiy way to retirement in a store-room or attic were soon rusted and ruined because the European climate lacked the dryness that would have protected them.

EFFIGY OF A KNIGHT on a Thirteenth Century tomb. His crossed feet indicate that he was a Crusader. From the Metropolitan Museum of Art

In the same way few of the household articles of the crusaders' world have survived in Europe. Castles, town houses, and peasant huts were constantly inhabited from generation to generation, and whatever became useless was destroyed. Even the rubbish piles, which are so eagerly searched by archæologists because of the valuable relics of a civilization buried in them, have been scoured in vain for traces of this dim period. Other scavengers, with less scholarly interests, had been there centuries before and salvaged anything that could be sold or put to any conceivable use. Only religious books, church art, and tombstones, have remained to show a little of the crusaders' ways of dress and their customs.

But in the Holy Land, where knights, men-at-arms, pilgrims, and children lived and struggled through two centuries, it seemed likely that more definite traces of their existence must have been preserved. The castles built by the Templars and Hospitalers in Palestine were, as the crusades petered out, captured one by one by the Saracens and the Egyptians, plundered of their treasures, and forgotten. Their Christian defenders had died by the thousands from wounds, scurvy, fever, heat and thirst. Those who survived journeyed back to Europe, leaving Jerusalem to the infidel and their castles to the dust.

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Show Life of Crusaders

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Montfort, near the city of Tyre, was one of the greatest of these castles and it has stood practically untroubled since the victorious Saracens left it in ruins in the year 1271. When Dr. Dean consulted the government of Palestine about examining one of the medieval ruins, they suggested this fortress because of its importance and its untouched condition. Montfort's fine strategic position, on the peak of a steep hill, and its fine water supply, had caused it to be selected as the headquarters and treasury of the Hospitalers' order. After its destruction its inaccessible position again protected it against the people of the surrounding countryside, who would have found its stones excellent building material if they had been within easier reach.

Under the leadership of W. L. Calver, the American expedition, eager to unearth whatever the Saracens had left, removed some 4,000 tons of soil and rock from the ruins and sent it sliding down the hill. They cleared out the floors of kitchen, armor workshop, chapel, and keep. They reinforced with concrete the arches that were in danger of falling, and they propped up shattered walls to prevent further collapse. And as they worked, they looked continually for the smallest fragments of metal, glass, cloth, or wood.

Forty baskets full of pottery and many other articles are the trophies of the expedition. The Palestine Government holds the bulk of the collection nearby in its museum at the town of Acre. The rest has come to New York and an exhibit has just been put on display at the Metropolitan.

"The outstanding feature of the investigation," says Dr. Dean, in a report of the expedition, "is the evidence that the knights of Montfort were living in Palestine, not under conditions of stress and hardship but on very much the same material level which they would have occupied in Europe."

The crusaders could not fight all the time, he points out. There were months and years when they simply held a fortress undisturbed—intervals of peace and of comparative leisure. Every art and craft and profession was represented in the motley army that had left home to fight for the Holy Sepulchre, and these workers had time to carve decorations for castles, to paint stained glass windows, to make wall paintings, glass bottles, pottery, and whatever else was desired. The keystones of the castle found by the expedition are elaborately and beautifully carved as evidence that the arts flourished as well in Palestine as at home.

Strange bits of information are learned from small objects in the ruins. Thus, a bronze thimble is said by Dr. Dean to be more cleverly designed than our modern sewing thimbles. The crusaders' finger guard fits the finger as if made from a mold. That is, one side is rounded, the other flat. A kohlstick, used by medieval women in applying cosmetics to their eyebrows, is the only relic from Montfort suggesting the presence of women there. The castle was in the hands of the French fighters until 1229, when they sold it to the German Hospitalers. Thus it became a monastery, for the knights of the hospital were monks. Yet, even so, ladies traveled there occasionally—as the small instrument of beauty testifies. A felt sole of a child's shoe brought back from Montfort recalls the children who took part in the holy conquest. And the whole examination of the castle is of value as a first step in the direction of learning exactly what manner of Europeans were there.

But for the most port, the finds unearthed about the castle are sug-

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ARCHÆOLOGY

Aztecs Had Their Bacchus

America, like Rome, had her Bacchus, and he chose as the scene of his operations one of the most curious and beautiful sites in all Mexico.

Built on the very tip of a finger of rock pointing to the sky, a thousand feet above the level of the plaza of the Aztec village of Tepoztlan, Morelos, below, stands El Tepozteco, the ancient temple of Ometochtli, Aztec lord of pulque and deity of drunkenness.

How the inebriated Aztec god—for the Indians of the valley below say that Ometochtli was "muy boracho," very drunk,—was ever able to scale the steep rock tower, cut off from its nearest neighbor by a shaft-like gorge, is a mystery. The perpendicular moss-covered walls are impossible to scale, but today the narrow shaft is partly filled with material that has fallen from the top. By means of steps hewn into this, and an iron ladder, the ascent is now possible.

El Tepozteco is a pyramid formed of four superimposed bodies, and on the flat surface on the top are the remains of the superstructure which served as the temple of the Aztec Bacchus. The sky may have been the limit for his worshippers, for the roof is gone and only stumps of the back and side walls remain. The entire front which faces the west is open to a stairway which leads up from the foot of the pyramid.

The temple is divided into two rooms by means of a wall with a door space in the middle. The front room has vestiges of what may have been altars, but the back room was built more with a view to comfort, for it has deep stone benches running around the walls on the three unbroken sides.

These stone resting places are built of blocks of volcanic rock sculptured with various symbolic motives. One of the most easily recognized of these hieroglyphic figures is the Aztec "precious liquor" sign which recurs a number of times around the bottom of the bench. It may have referred to the "likker" consumed by Ometochtli and his cronies, or merely to precious human blood spilled on sacrificial altars.

The inner walls of both rooms are richly carved, although many stones are now missing. The entire structure is built of porous volcanic rock which must have been carried from the valley below, for the mountain itself is of an entirely different geological formation.

(*Just turn the page*)

SEISMOLOGY

JAMES BERNARD MACELWANE

Head of Earthquake Students

A short time ago the Seismological Society of America elected Father Macelwane as their president, succeeding Prof. Bailey Willis, of Stanford University. In making this selection, they assured that one distinguished American seismologist would be followed in the office by another. Prof. Willis is one of the pioneers in the American study of earthquake. Father Macelwane's interest in the subject is more recent, but his work has already made possible more accurate location of earthquakes from seismograph records. In addition, as Director of the Central Station of the Jesuit Seismological Association, he has the important duty of coordinating the seismic investigations of the Society of which he is a member.

In the opinion of his fellow seismologists, Father Macelwane's most important researches have been in his continuation of the work of the European seismologists, Gutenberg and Mohorocic. This was a study of how earthquake waves travel—how long it takes certain waves to go from the epicenter to a seismograph which records them—how certain waves are reflected and refracted as they pass through different layers of the earth's crust and core. In Father Macelwane's tables, many of these reflected and refracted waves that were hitherto neglected are used. All of this makes the record left by the swaying needle of the seismograph give up more of its secrets; and so helps us to gain a more intimate knowledge of these often disastrous tremors of the globe.

Father Macelwane is a native of Ohio, having been born near Port Clinton on September 28, 1883. He graduated from St. Louis University in 1910, then took his Master of Arts

(*Just turn the page*)

PHYSICS

Air Changes Cause Static?

Changes in atmospheric pressure may be one cause of static, greatest bane of the radio listener. This suggestion was made to the American Physical Society by Dr. Richard Hamer, assistant professor of physics at the University of Pittsburgh. Not only static, but the related phenomena of earth currents, and the variations in the earth's magnetism, which make the compass needle change its direction, may possibly be explained similarly, he stated.

Dr. Hamer described a series of experiments he has made to study this possibility. He took a glass tube, in which was some moist earth, and connected the top and bottom to a sensitive galvanometer. On account of weak acids present in the soil, a slight current flowed through the circuit, which was indicated by the galvanometer. When the air pressure in the tube was changed suddenly, the current varied also. Precautions were taken to prevent any effect due to the pressure decreasing the resistance of the soil, in the same way pressure on a telephone diaphragm decreases the pressure of the carbon grains in the transmitter.

When the galvanometer was replaced by a electrometer connected only to the top electrode, variation in pressure within the tube was found to produce an electrical charge in the electrode.

Dr. Hamer explains this effect as apparently being due to a temporary disturbance in the distribution of the electrons—the atoms of electricity—in the earth when the pressure changes.

"The experiments," says Dr. Hamer, "seem to afford obvious explanations of the many various facts peculiar to propagation of radio waves, especially in the case of reception. Possibly barometric changes cause variations in earth currents directly, and also indirectly by varying surface soil resistance. If these are large enough to produce observable magnetic effects, they may explain why magnetic variations seem to parallel those of the earth currents."

Science News-Letter, December 3, 1927

Although children in New Zealand are exceptionally healthy, they suffer more from decayed teeth than children in England.

Sturdy wild beets are being used by government scientists in an effort to breed greater resistance to disease into the cultivated sugar beet.

New material on Psycho-Analysis by one of the most distinguished living authorities.

Theory and Technique of Psycho-Analysis

By Dr. Sandor Ferenczi

The noted British Psycho-Analyst John Rickman, compiler of this book, declares that it contains some of the most important contributions to psycho-analysis that have been made in the last decade.

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Head of Earthquake Students

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and Master of Science degrees at the same institution in 1911 and 1912. After teaching physics there for several years, he went to the University of California to take his Ph. D. in 1923. Until 1925 he was in charge of the seismograph station there; he returned to St. Louis as professor of geophysics, and director of the department, which position he still holds.

Science News-Letter, December 3, 1927

The oldest known flowering plants were mostly green, yellow, or white.

The industrial center of the United States is about 50 miles southeast of Chicago.

There are 30,000 crippled children in New York State, the chief cause being infantile paralysis.

A new electric brake system for automobiles is said to stop cars effectively using very little current.

American Guernsey cows are as good milk producers as cows from the Island of Guernsey, an investigation shows.

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Aztec Bacchus

(*Continued from page* 355)

When the Indians deserted El Tepozteco after the Conquest, they gave it a burial under earth, says Jesus Conde, guardian of the ruins. It was uncovered 30 years ago but it has never been thoroughly studied by archæologists.

The pinnacle on which El Tepozteco stands is merely one of a chain of similar rock formations, all of which Senor Conde has climbed. On the tops of some of the others are also remains of ancient structure, he told Senor Eduardo Noguera, of the Department of Archæology of the Mexican Ministry of Education, who has recently inspected the site.

El Tepozteco has perhaps the most marvellous view in Mexico. One side looks down a dizzy shaft studded with dwarfed palms, enormous fire-colored poinsettias, and other semi-tropical flowers and plants growing in the crevices. The shrill songs of birds echo and re-echo in the stillness.

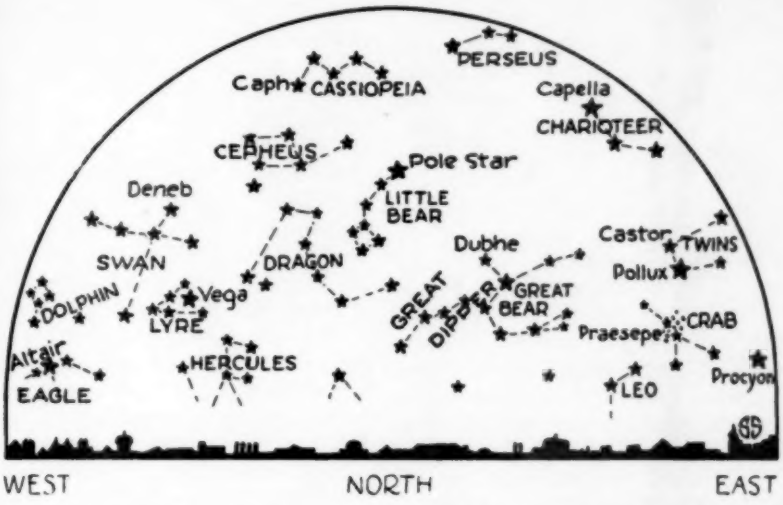
Above, the wild bees hum around the ancient bacchanalian temple. On the opposite side, Tepozteco looks far and wide over the state of Morelos and down into the green valley below in whose lap nestles the Aztec village of Tepoztlan. Faint far away sounds of roosters crowing and dogs barking come up from below as well as the sleepy sound of a Christian church bell at midday.

The village has changed very little from its days before the Conquest. Although it has four churches and a Dominican convent dating from 1560, Aztec is still the common language spoken. Each stone hut still has its ancient lands, and the lava fences enclose rich gardens of tulipan, poinsettias, roses, guyabas, alligator pears and bananas. Except around the plaza, there are no two houses built together in the whole town of some 4,000 inhabitants, a thing unusual in Mexican native villages where the white man has had an influence.

Tepoztlan has no postoffice, no drugstore, no doctor, no lights at night, and it almost has no clocks. The Indians go to bed when it gets dark and get up long before the sun to work in their fields. There is no road to the outside world except a track over the hard lava. They want no other road because it might let in the motor trucks and throw their burros, their only invested capital, out of a job.

Science News-Letter, December 3, 1927

Jupiter With Nine Moons Now in Southern Sky



By James Stokley

Jupiter, the "giant planet," is one of the chief heavenly attractions this month. It is evening, and clear. See that bright star over there in the southwest? Yes, that very bright one. That is Jupiter, and though it looks so small out there, more than 400,000,000 miles away, it is really the largest of our family of planets that make up the Solar System. So large is it that if it were hollow the earth and the moon, Venus, Mercury and Mars could be put inside and still they would rattle around with plenty of room to spare. In fact, there is enough material in Jupiter to make all the other members of the Solar System except the sun from it, and still have some left over.

The earth has a diameter of about 8000 miles, but the average diameter of Jupiter is about 86,720 miles. It has 120 times the surface of the earth and 1312 times the volume. Its mass is 317 times that of the earth, so it is only about a quarter as dense as our planet.

Has Nine Moons

Perhaps the most interesting thing that a visitor to Jupiter from the earth—if he could make the trip—would notice would be the number of moons. In the Jovian night sky would appear not a single moon, like ours, but no less than nine. For that many are known, the last one having been located as recently as 1914. Perhaps there are even more that will come into our view as we continue to get larger telescopes.

Our moon is about a quarter of the diameter of the earth. From another planet, the earth and moon would look more like a double planet than a main body and a satellite. In the case of Jupiter, however, the discrepancy between the size of the planet and of the satellites is much greater. The four largest of the Jovian moons, which Galileo discovered in 1610, range from 2320 to 3220 miles. Thus they compare favorably in size with our own moon, or even with the planet Mercury.

But in the case of the other five moons, the difference is much more marked. So small are they that their diameter canot be measured exactly, but that of number nine is estimated at only about 25 miles. Number six may be as large as a hundred miles in diameter. Number 8 and 9 have another outstanding peculiarity. They are moving backwards! The other moons of Jupiter, like our moon, revolve around the planet in the same direction that the planets move around the sun: that is, from west to east. But numbers 8 and 9 go from east to west.

Number Eight's Eccentricty

Number 8 misbehaves in another way. Its orbit is extremely eccentric. That is, though it revolves around the planet in two years, it sometimes comes as close to it as 9 million miles, while sometimes it recedes as far as 20 million. But its orbit is not constant. In the eight years following its discovery in 1908 it made all sorts of variations. Sometimes it went around the planet in 713 days, sometimes it took as much as 768, and it varied in other ways as well.

Now it is conceivable that at some time this moon might get about twice as far from Jupiter as it has in recent years. This might occur when it is between the planet and the sun. What would happen? If it occurred, the gravitational pull of the sun on the satellite would be as great as the pull of the planet, and the result would be the loss of a moon. There are already known to be a thousand or so tiny bodies of the same general character as this little moon of Jupiter revolving around the sun. These are called minor planets, or asteroids, and it is this family that moon number eight would join.

Moons Captured Asteroids?

This being the case, the suggestion has been made that the reverse process occurred at some time in the distant past. An asteroid might have ventured too close to Jupiter, and he, by his gravitational pull, might have adopted the asteroid as a satellite. It is quite common for

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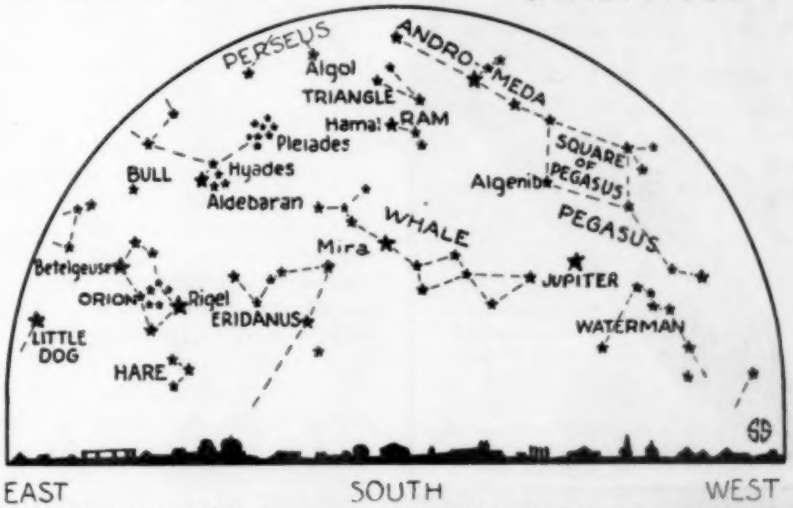

HOLD THESE MAPS before you, and they depict the December evening sky as it appears to you when you face North or South

December Evening Skies

(*Continued from page 357*)

Jupiter, by his great pull, to put a considerable kink in the orbit of a wandering asteroid or comet that gets too close. It seems quite possible, then, that the smaller satellites of Jupiter might have been acquired by such means. Prof. F. R. Moulton, formerly of the University of Chicago, has worked out in great detail how this might occur, though he does not think that the chances of it happening are very probable.

Jupiter Hides Star

One of the rarest of astronomical phenomena, an occultation of a star by a planet, will take place next Wendnesday night, December 7. Wherever it is clear, and there are astronomers, it will be watched, for, unfortunately, at least a small telescope is required to see it.

The moon, and the planets, move around the sky among the stars. In fact, the very name "planet" means a wanderer. As a result, they occasionally come between the earth and one of the stars, thus temporarily hiding it. This is called by astronomers an "occultation." With the moon so much closer the earth than the planets, and so appearing with a larger area, occultations by the moon are rather common. In fact, scarcely a night passes without the moon occulting some stars at least visible in a small telescope, and occasionally one visible to the naked eye is hidden.

With the planets, which appear to the naked eye as points of light, it is not often that one comes exactly between the earth and a star of any brillance. But next Wednesday, Jupiter, largest of all the planets, in the southern evening sky, occults a star of the seventh magnitude, just a bit too faint to be seen with even the keenest of eyes. As it is not a naked eye star, it has no common name. It is in the constellation of Pisces, but to astronomers it is known by its number in the Bonn *Durchmusterung*, a catalog of stars prepared in Germany many years ago. It is thus referred to as B.D.—3° 5697.

The time that it will take place, and, in fact, the first discovery that it would take place at all, was made by Dr. L. J. Comrie, now of the British Nautical Almanac office in London, and formerly at Swarthmore College, in Pennsylvania. In the last few months, Drs. Seth B. Nicholson and R. S. Richardson, of the Mt. Wilson Observatory in California, have made some new photographs of Jupiter to determine its position more accurately. As a result they have placed a small correction on Dr. Comrie's figures, which were based on the most accurate data then available.

At Washington, D. C., where it will be observed by astronomers at both the U. S. Naval Observatory, and the observatory of Georgetown University, immersion, or the time at which the star vanishes behind the planet's disc, will take place at 6:30 p. m. eastern time. In the middle west it will be a minute or two earlier, but in the far west it will not be seen, as Jupiter will then not have risen in the east. The emersion, when the planet has moved on sufficiently to reveal the star on the other side, will take place, according to schedule, at 10:35 p. m., eastern time, at Washington. It will be visible throughout the country.

Unlike the disappearance of a star behind the moon, the occultation by a planet is gradual. The moon has no appreciable atmosphere, so a star is seen until it reaches its edge, then it vanishes instantaneously. Jupiter, however, has some sort of a gaseous layer around it, so the star gradually gets dimmer as it gets closer and closer to the edge of the planet. Thus it is rather hard to measure the time of disappearance precisely, but from the observations of a number of observatories, useful information can be gained about the nature of the Jovian atmosphere. The reappearance, too, is gradual.

A week later, on December 14, the planet Venus also occults a faint star, but this is only visible from Japan, the East Indies, and the coast of China, so while the star is a little brighter than the one hidden by Jupiter, it will not be of much interest to American astronomers.

The Stars in December

As for the stars in the month of December, they are now in their typical winter aspect. Orion, doubtless the most magnificent of all constellations, is high in the southeast, Cetus, the whale, spreads his huge bulk across the southern sky, not far from Jupiter, while higher is Andromeda, the chained lady, joining to the east with the "great square" of Pegasus, the winged horse.

High overhead is Perseus, with Algol, the demon star, which is ordinarily of the second magnitude, but which fades out for a while at intervals of 2 days and 21 hours. At 8:40 p. m., eastern standard time, on the evening of December 3, for instance, it will be at minimum brightness. Then it will appear to be much fainter than at the same time on the evening before or after. Other times of minimum brightness in the evening this month are at 5:30 on the 6th, 10:20 on the 23rd, 7:10 on the 26th and 4:00 on the 29th. Algol takes about five hours after its light starts to diminish until it is at minimum, and about five hours more to recover to its former brightness.

Frequently Eclipsed

This change in brightness of Algol is caused by the fact that it really consists of two bodies—one bright and one dark, which revolve around each other. At the times of minimum brightness, the dark component comes partly between the earth and the bright one, thus reducing its light. This is called an "eclipsing variable" star, and several hundred like it are now known.

Southeast of Perseus is Taurus, the bull, with the beautiful loose cluster of the Pleiades, and the brilliant red Aldebaran. In the northern sky the Great Dipper is below the pole, and the great W of Cassiopeia above it. The triangle of Deneb, Vega and Altair is over in the northwest, while Castor and Pollux, the heavenly twins, rise in the northeast.

The principal thing that the sun does this month is to reach the tropic of Capricorn at 3:18 p. m., eastern standard time on December 22. At this the sun reaches its farthest south position, and starts travelling northwards again, and according to our chronology, winter commences.

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Say you saw it advertised in the SCIENCE NEWS-LETTER

Airplanes and Monkeys Rivals as Noise-Makers

Following are reported some of the interesting papers presented at the recent Washington meeting of the American Ornithological Union.

The howling monkeys of the Canal Zone cherish deep resentment against airplanes. It is the first time they have ever encountered a serious rival in the production of noise, Dr. Frank Chapman, of the American Museum of Natural History, told the Union in reporting the activities of the station for the study of wild life at Barro Colorado Island in Gatun Lake.

"If a coat of arms is ever devised for Barro Colorado," said Dr. Chapman, "it should show several howling monkeys shouting furiously at an airplane."

This tropical laboratory offers unique opportunites for the study of birds and animals under undisturbed natural conditions. It is the only place where the flora and fauna characteristic of the American continents in the tropics can be studied within the jurisdiction of the United States. Since all the rest of our tropical possessions are islands, having their own characteristic types of animals, Barro Colorado presents special advantages to scientists interested in the tropical wild life of the continent.

The island, which is really a headland of the mainland cut off by the backing up of waters reserved for the locks of the canal, is teeming with birds and animals of the most diverse forms. "On a single morning," said Dr. Chapman, "I observed passing before my door any number of coati, (a small animal about the size of a raccoon) a little flock of peccaries, a procession of howling monkeys and the Duke and Duchess of York."

As a result of his observations on the island, Dr. Chapman has reached the conclusion that the turkey buzzard's unerring instinct for locating carrion is due to a phenomenally keen sense of smell as much as to the sense of sight.

The famous ornithologist is particularly interested in the study of the habits of the tropical relative of the Baltimore oriole. Careful observation of a colony in the treetops revealed the fact that the females build the long pendulous nests quite unassisted and vie with each other for the favors of the polygamous males. Only seven of the latter were counted in a colony of 42 females.

A tiny humming bird nesting in the same neighborhood with the orioles was discovered to be dominating the whole tree. Regardless of her minute size, the orioles many times bigger were observed to be giving Mother Humming Bird, with her sharp beak, complete right of way.

Storks Find Way South

Young storks know the way to the winter stamping grounds of their race whether they have a leader to show them the way or not, German scientists have found.

Studies with the birds that show that the migratory instinct manifests itself in storks regardless of outside influences were reported to the Union by Dr. Theodor G. Ahrens, an American ornithologist living in Berlin.

Young storks with wings partially clamped down to prevent flying and fitted with indentification bands, were kept in a marsh near Rossitten, East Prussia, by Prof. A. Thienemann of the Christian Albrechts University of Kiel. When the migrating season approached the birds were kept in cages until all the storks in Germany had flown south. Then they were carried back to the marsh and released. Reports of their band numbers, received from ornithologists in various parts of East Prussia who had picked them up, showed that they had followed more or less the customary route south without the guidance of leaders.

By December one of the birds was shot at Keratea, not far from Athens, Greece. The Greek police had some difficulty, Dr. Ahrens reported, in inducing the hunter to give up the bird's leg band because he wanted to keep it as a talisman. Some twenty other storks were seen in the same region at the same time. This report indicates that the leaderless storks while keeping to the south had veered to the west instead of taking the usual route to Africa by way of Asia Minor and Palestine. In spite of having been forcibly detained beyond the customary time for migration when the chance came, Dr. Ahrens pointed out, the birds knew what to do and did it.

Prof. Thienemann repeated the experiment on a larger scale during the fall of this year but returns have not yet been received to indicate the route by which the second lot of storks eventually found their way south. The large quantity of food that storks require, estimated by Prof. Thienemann as over a pound of fish, frogs and insects per day, is thought to be one reason for the decrease in the numbers of these birds Drainage of marshes and the growth of cities makes it more and more difficult for them to get food. The systematic use of poison to kill insects in South Africa has also resulted in the death of many more storks, who eat the poisoned insects for food while sojourning in their southern range.

Cowbirds "Borrow" Nests

An attempt to trace the evolution of the bad habits of the cowbird, the social parasite of the bird world, has been made by Herbert Friedmann of Amherst College. The cowbird's eggs have been found by Mr. Friedmann in the nests of as many as 195 species of birds.

A whole series of South American relatives of the common cowbird show different stages of the practice of getting other birds to bring up their offspring, Mr. Friedmann reported recently to the American Ornithologists' Union. One species of Argentinian cowbird has the parasitic habit only developed so far as it affects the use of nests. They have delayed their breeding season so late that they can occupy the nests built by other birds earlier in the season. Though, unlike the cowbird of the north, they incubate their own eggs and rear their young themselves, they will not make a nest of their own if they can possibly help it.

Another species preys on this variety and attempts to possess themselves of the habitations in which their cousins are squatting, but as Mr. Friedmann pointed out, their choice of birds to disposses is probably limited because no others set out to raise families so late in the year.

In Central America still another variety of cowbird has a preference for the nests of its near relatives, the orioles. Others show great wastefulness in disposing of their eggs, several clubbing together to fill up an alien nest with 25 or 30 eggs, Mr. Friedmann declared. The original owner evacuated long before this number was laid so that none were hatched.

It would appear that, for complete

(Just turn the page)

Ornithological Meeting

(*Continued from page 359*)

efficiency in getting other birds to hatch and rear their young, none of the South American types observed by the Amherst scientist approach the rascality of our native cowbird.

"Wrenograph" Checks Birds

An elaborate electrical device on the order of a potentiometer has enabled S. Prentiss Baldwin, director of the Baldwin Bird Research Laboratory, to tell exactly how much time Mother Wren spends on the nest incubating her eggs and how much time she takes off.

Thirteen minutes appears to be about the average length of the time she can stick on the job but she seldom stays off longer than six minutes. Almost always she broods her eggs all night during the nesting period, though Mr. Baldwin has a record of one flightly female wren that went out for the evening at 8:50 p. m. and did not return until 1:04 a. m. During the last three days of the incubation period the absences are much less frequent but of about the same duration, the ornithologist has found.

The wrenograph, as Mr. Baldwin has christened the instrument, is an thermoelectrical apparatus connected with the electric light circuit that registers the temperature apparatus connected with the electric light circuit that registers the temperature of the nest each time bird goes on and off the edges. A tiny wire is stretched across the eggs. It looks about like a strand of straw from the nest lining. This wire is connected with a self-recording instrument in the laboratory that registers on a chart the temperature accurate to within one degree Fahrenheit. It is probably the first time that such apparatus has been used to obtain accurate information about the life history of birds.

Two other instruments based on the same principle but not self-recording give more accurate nest and egg temperatures as well as the temperature of the atmosphere near the nest. This enables the bird research workers to note the temperature adjustments in the nest to the warm and cold "spells" outside during the incubation period.

Mr. Baldwin, assisted by two young ornithologists, has been engaged in making an intensive study of house wrens at his laboratory at Gates Mills. Hundreds of pairs of these vociferous songsters nest in the vicinity in specially constructed and numbered bird houses. By banding the young wrens shortly after they are hatched, a daily record is kept of the life of the wren inhabitants of the bird boxes over a range of a hundred acres. From the data he has compiled in this new field of research, Mr. Baldwin expects to write a monograph on the life history of the house wren.

Birds Build Apartments

Cooperative apartments on the most approved modern plan are built by birds in the tropical forests of Haiti, according to Dr. Alexander Wetmore of the Smithsonian Institution, reporting on his travels in the island republic before the meeting.

The birds in question are known as palm chats. They are small, gentle - mannered, socially - inclined birds that are always found in flocks, and they build their community nests at the tops of tall royal palm trees. Each pair of birds assembles a large ball of sticks, which interlaces at its sides with other balls in the mass. At the top of each ball there is a teaspoon-sized depression, where the single egg is laid.

Another communal nestbuilder was described to the exploring party as the work of a tropical oriole. They found the nests, but discovered that they were the work of a weaver finch from Africa. There was a good deal about the general appearance of the nests, as they hung in the trees, to suggest the work of orioles.

One of the prizes of the expedition was an entirely new species, a thrush-like bird that lives in the dense jungle.

Spider Catches Sparrow

The meshes of a spider's web may sometimes prove as fatal to a full grown bird as to the lesser fry of the insect world. John B. Semple and Vernon Bailey, the latter a member of the staff of the U. S. Biological Survey, recently found near Sandusky, Ohio, a song sparrow suspended in a spider's web where it had evidently met its death from starvation.

Both the bird and the web were collected intact and taken to Washington where they were put on exhabit at the meeting.

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PHILADELPHIA

Say you saw it advertised in the SCIENCE NEWS-LETTER

THE CASTLE OF MONTFORT, near Tyre, stormed and plundered by the Saracens in 1271; explored by American scientists in 1927, under the auspices of the Metropolitan Museum of Art

Show Life of Crusaders

(*Continued from page* 354)

gestive of war. The armor shop yielded fragments of various kinds of war equipment, but no complete helmets or swords, or garments of chain mail, for which the expedition had hoped. The fragments, however, tell their story. Even lumps made up of rusted, twisted links of iron show the weight of the rings of which the chain armor was made. And even a small piece of a pot helmet is treasured by the armor expert, since no helmet of this type is to be found in any armor collection. Wooden arrows with eyes painted on them are valued relics, too, for they show that the medieval warrior was simple-minded enough to believe that an eye painted on a dart would help it to find its way.

In one corner of the kitchen a mortar and some glass bottles indicated to the excavators that here must have been the drug booth—an important part of the castle.

Even the chapel held its souvenirs of war. Numerous stone "cannon" balls had been slung into this particular room, chiefly, Dr. Dean points out, because its larger stained glass windows afforded an easy mark.

The chapel contained what is perhaps the most curious find of the collection, a wine jar of the time of the Roman Empire, and carved with the heads of Bacchus and Ganymede.

"It is puzzling to suggest why an object of this kind should turn up in the debris of a thirteenth century Christian chapel," Dr. Dean says. "It may have been used as a fountain—and a fountain it was, since the mouths of the figures are pierced—or as a baptismal font or receptacle of holy water. In churches during the Middle Ages pagan objects were often used in ignorance of their early purpose. A Roman sarcophagus or bath in the cathedral of Tarragona has served for centuries as a baptismal font. And in the present case it is not impossible that the Roman gods were given biblical names."

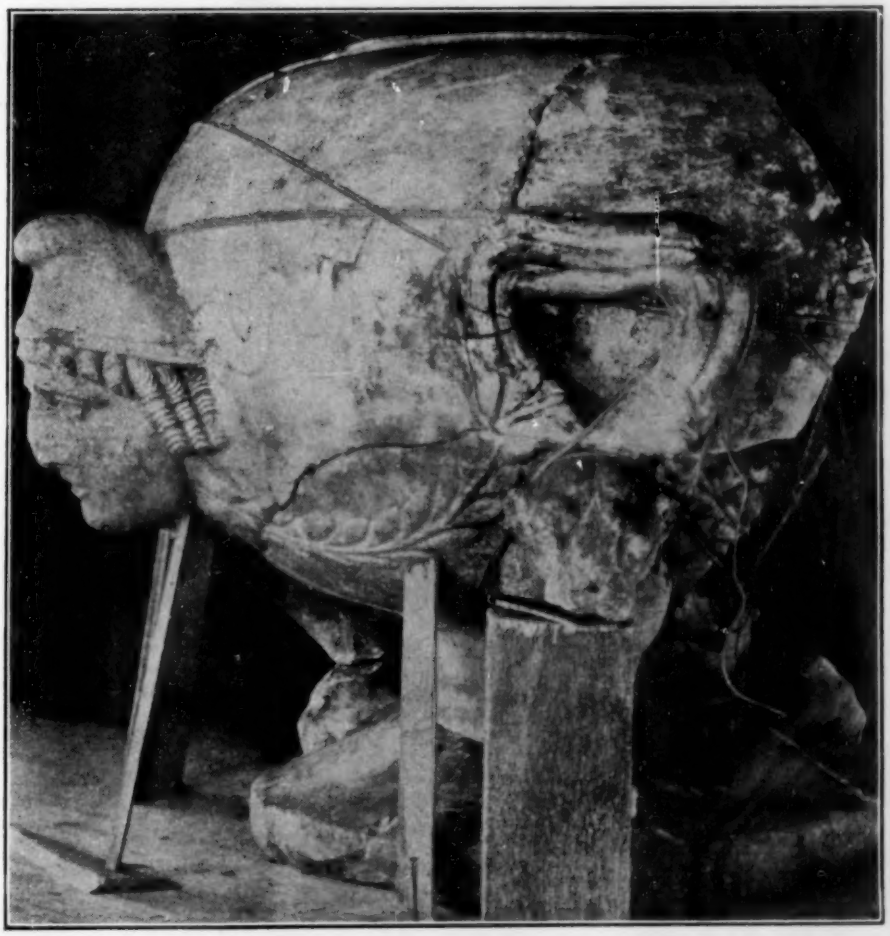
The cisterns were particularly sought out by the excavators, in the hope that the besieged warriors might have tossed their choicest treasures down the wells for safety, as desperate people often have done, but if the crusaders hid anything of value there, the Saracens knew the same trick and fished it out.

"No rubbish heaps were brought to light," Dr. Dean states, "a fact the more remarkable since Mr. Calver, the director of our reconnaissance has an incredible flair for locating ancient dust-heaps and making important finds in them. He speedily discovered the rubbish chute through which refuse of the residence was dropped down the hill; he traced out this line of descent but ascertained that so much debris had covered it up in the past centuries and distributed the materials over so great a distance that it proved impracticable to dig them out successfully.

"Nor were cemeteries investigated. No cemetery was discovered dating definitely from the occupation of Montfort, yet there can be little doubt that in the immediate neighborhood many burials were made. The fortress was occupied and garrisoned at least for three score years; its people died in great numbers; it is generally admitted that Syrian fever and dysentery claimed at least as large a percentage of the Westerners as the arms of the Saracens. The unsuccessful siege of 1266 must have filled on either side a reasonably large cemetery. Until local burials are examined no exploration of the castle will be complete."

Whether the graveyard of the crusaders will be further sought, is uncertain. The first brief excursion

(*Just turn the page*)



A STRANGE OBJECT to be found in a Christian chapel. It is a Roman wine jar, adorned with pagan gods. It is suggested that the early Crusaders might have used it as a baptismal font, in ignorance of its original use. From the Metropolitan Museum of Art

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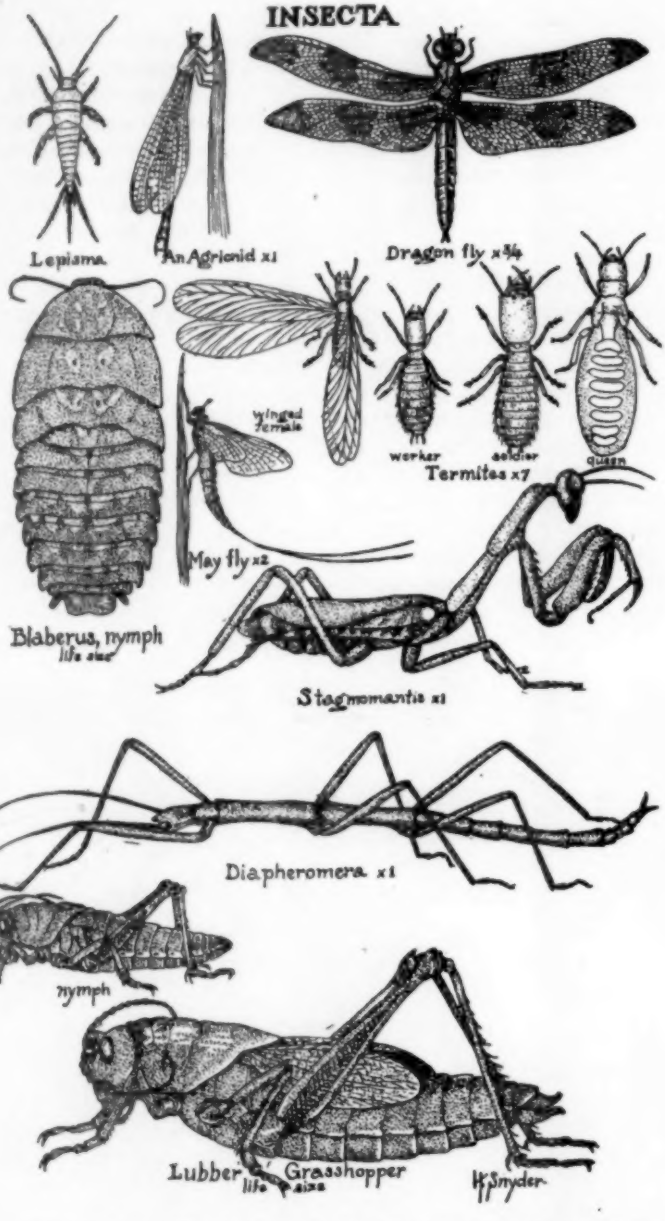

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Show Life of Crusaders

(*Continued from page* 361)

of archæologists into this particular field of Palestine history has been decidedly profitable. The interest which it is arousing may lead to further expeditions intent on recapturing the reality of the Crusades.

"The examination of Montfort," Dr. Dean concludes, "is of value as a first step in the direction of learning concretely what manner of people were the European hosts of the thirteenth century. We now know, for example, what kind of mail they wore, at least as to the size and weight of the links, finding for the first time specimens which may be dated with reasonable accuracy. We are familiar with the types of arrows which the crusader used in his engagements and the points of his lances.

"We have seen the moulds, finely chiseled in stone, into which he pressed his straps in decorating his belt, or his badges worn as marks of recognition—objects delightfully designed and spirited.

"We know today many objects associated with the crusader's daily life—his pottery and glass, his pitchers and bowls, his wooden spoons, his thimbles and needles, even his kohl-stick which he may have presented to an ambient friend. We have seen his tent peg carved with heraldic bearings; the rings to which he tethered his steed. We may even picture him carrying his pottery lamp, long beaked, green enameled, as he picked his way up the steep stairs, or may see his outline and the sheen of his mail by the light of transparent glass lamps swinging from the ceiling by chains attached to handles of cobalt blue glass. We know even definitely what buckles he wore in his costume, and we can suggest what manner of bronze bosset touched his hand when he held his stallion's bit."

Hope of finding the crusader's armor, however, is fading. The survey showed that conditions in Palestine are unfavorable for the preservation of iron objects.

"Even had we had considerable time at our disposal and unlimited funds, Mr. Calver and his staff were firm in the faith that we could not expect to obtain, under local conditions, such objects as a complete helmet or a well-preserved sword," writes Dr. Dean.

It begins to look as if the missing links of medieval armor in the great armor collections would remain undiscovered.

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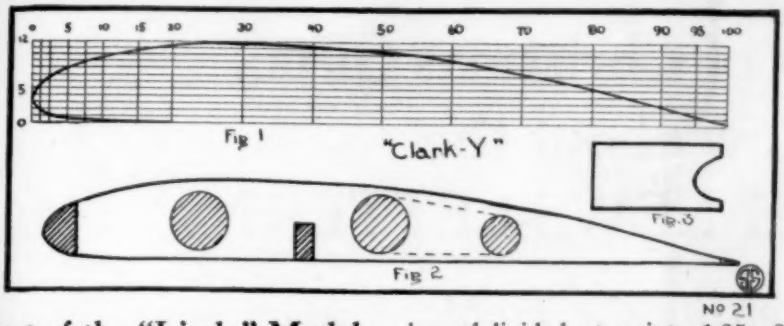

Wing of the "Lindy" Model

This is the sixteenth of a series of articles by Paul Edward Garber. Mr. Garber is in charge of aeronautics at the Smithsonian Institution.

As explained in THE SCIENCE NEWS-LETTER for October 8, the wings of modern aircraft are patterned with every means taken to secure efficiency. The shape of a wing surface determines the airworthiness of the completed airplane. The designers of "The Spirit of St. Louis" adopted a shape known as the Clark Y for Lindbergh's plane, because it imparts to an aircraft the two desired properties of speed and lift.

In the article above mentioned, I explained how to draw a wing section from data given. In that article the ordinates (or points determining the shape) were given in fractions. This time we will list them as decimals, for it is in this manner that they are given in all journals on aeronautics. After you have built this model of Lindy's plane you may want to make other models and when you come to duplicate the wing section you will use references that list the ordinates in decimals.

Aeronautical books quote close fractions to insure absolute accuracy in making the large ribs for man-carrying aircraft. A difference of a fraction of an inch will often change the properties of the wing. In making your model try to place your intersection marks as close as possible to the correct position in order to derive the most efficient results.

Figure 1 shows a screen or graph which you are to make 5½ inches long. Having drawn a line of that length you divide it into ten parts. Another line is to be drawn below it as a distance of one-tenth of five and a half inches. This space is also divided into ten parts and lines drawn horizontally from each subdivision. Two extra lines are added. Vertical lines are to be drawn downward from each division in the top line, to be numbered from zero to 100. The space between zero and ten is to be subdivided at points 1.25; 2.5; 5 and 7.5. Similarly marks are to be made at 15 and 95, and lines are to be drawn downward from all these points. The graph is now ready for use. The table below shows at what points on the vertical lines marks are to be made to indicate the intersection of the upper and lower surfaces. When these marks are joined the Clark-Y outline will result.

Vertical Line	Upper Surface	Lower Surface
0	3.5	3.5
1.25	5.45	1.93
2.5	6.5	1.466
5	7.9	.933
7.5	8.85	.629
10	9.6	.42
15	10.685	.15
20	11.36	.033
30	11.7	.0
40	11.4	.0
50	10.515	.0
60	9.148	.0
70	7.35	.0
80	5.216	.0
90	2.802	.0
95	1.494	.0
100	0.12	.0

The piece of paper upon which this section has been drawn is now to be pasted on a piece of tin and the outline cut out, making a pattern. Cut off the nose of this pattern ¼ inch from the front and the tail ⅛ inch from the rear, eliminating the shaded portions in Figure 2. Cut out the ⅛ x ¼ inch opening in the bottom 2½ inches from the original front and mark the center of the holes for lightening where shown. Now procure 17 slats of wood 5⅛ x ¾ x 1/16 inches. Balsa wood is preferable but pine may be used. On each of these trace the pattern and cut out the shape, excepting that in two instances, the slats are to be cut to the original outline. The holes can be made by burning with a piece of hot tube, and the rear two may be joined as shown by the dotted lines to further eliminate weight. Figure 3 shows a piece of tin or other metal which has one end ground out to the shape of the nose of the rib shown shaded in Figure 2. This is to be used in making the rest of the wing.

Science News-Letter, December 3, 1927

ZOOLOGY

Pet Deer at Grand Canyon

The pet problem has been solved for the children of the Government staff at Grand Canyon National Park. Denied the customary cats and dogs through park regulations, they have been given ten fawns from the deer herd in the Kaibab National Forest north of the Park, and are now quite happy.

Dogs and cats are forbidden within the park partly because they are predatory animals and likely to kill, or at least annoy, the native wild population. The substituted fawns were provided by arrangement between the U. S. National Park Service and the U. S. Forest Service, and were transported from the North Rim to the South by truck. One of the ten escaped, and one died not long after its arrival at park headquarters, but the surviving eight are thriving and have become very tame.

Science News-Letter, December 3, 1927

EUGENICS

Dodo and Ginkgo Tree

Sprung of the men who found this land,
Sprung of their sons who tilled it,
Sprung of their sons whose rigid hand
Reined it, whose strong loins filled it
With sinister and dexter kin,
We stand, these lords' descendants,
Gaunt, gone to seed, misfitted in
An ailing superintendence.

Grace we have, of decaying kind,
Wit to greet any scourging,
A warped will and a hectic mind,
And a weak body's hot urging.
And the dodo went, and the ginkgo tree
Goes slowly, pampered and coddled:
And so, scions of the past, are we,
With souls and bodies addled.

Sprung of the men who lorded it
Over a new world's wonder,
We dodder with our sunset wit,
And never a clap of thunder
To mark this lessens, this dims, this goes,
This echo of a splendid
Hour that crumbles with Eden's rose,
Its last long agony ended.

Prince, let me summon your spectre out,
Gall's no unmanly quaffing;
We faint erect beneath the knout,
Laughing, still laughing.

Clement Wood, in the Commonweal

Science News-Letter, December 3, 1927

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First Glances at New Books

THE HIGHER FOOLISHNESS—David Starr Jordan—*Bobbs-Merrill* ($2.50). The famous chancellor of Stanford University lightly discusses sciosophy in all its branches. The word means, he says, "by direction, 'the wisdom of shades', and, by inversion, the 'shadow of wisdom.'" Under it he includes such problems as the "spontaneous activity of shadows," photography of thought, astrology, and other manifestations of pseudo-science, so that the book is somewhat reminiscent of Augustus De Morgan.

Science News-Letter, December 3, 1927

NEW METHODS IN GEOMETRICAL OPTICS—Charles S. Hastings—*Macmillan* ($2). The distinguished professor of physics of Yale University, who calculated the curves for many of the big telescope lenses, tells of some of the novelties he has employed and how others can apply them.

Science News-Letter, December 3, 1927

GEOLOGY MANUAL — Richard M. Field—*Princeton University* ($2.50). Something geology teachers have been waiting for: a compact but comprehensive group of laboratory problems, with space at the end of chapters for the addition of the instructor's remarks and plenty of blank pages and tables for the student's record.

Science News-Letter, December 3, 1927

INVENTIONS AND PATENTS—Milton Wright — *McGraw-Hill.* What is there to invent? How can an invention be patented? How can capital be raised to market an invention? All these questions, and many others along the same line, are answered in this book by an experienced patent attorney. And his interesting style makes the book as enjoyable reading as a novel.

Science News-Letter, December 3, 1927

THE COMPLETE PRESS PHOTOGRAPHER — Bell R. Bell — *Pitman* ($2.50). A full and interesting account of newspaper photography as practiced in Britain. American methods are sufficiently similar to make it helpful to the amateur photographer here who wants to make a little money on the side by selling the products of his camera for publication. A similar work, written with American markets particularly in mind, would be very valuable.

Science News-Letter, December 3, 1927

CANDLE DAYS — Marion Nicholl Rawson—*Century* ($3.50). If antique-collecting is ever to become anything more than the competitive accumulation of curios, an intelligent literature on the subject will be necessary. This book makes a worthy contribution to that end.

Science News-Letter, December 3, 1927

THIS SMOKING WORLD—A. E. Hamilton—*Century* ($2.50). Something of the history of tobacco, a little of its physiology, and a great deal about the the propaganda that periodically rages over its use.

Science News-Letter, December 3, 1927

WHY STOP LEARNING?—Dorothy Canfield Fisher—*Harcourt, Brace* ($2). Encouragement for the adult who feels that there is a good deal left to learn but is diffident about his ability to learn it. Suggests ways and means.

Science News-Letter, December 3, 1927

DRAGON LIZARDS OF KOMODO—W. Douglas Burden—*Putnam.* In addition to full details of the capture of these monsters of the "Lost World" of Malaysia, the book contains many interesting particulars of the human and animal populations of the islands of the Dutch East Indies.

Science News-Letter, December 3, 1927

WEATHER OBSERVATIONS AND AIDS TO FORECASTING—Donald W. Horner —*Macmillan.* A condensed account of the elements of meteorology as practised in Britain.

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WHO'S WHO IN OCCULTISM, NEW THOUGHT, PSYCHISM AND SPIRITUALISM — Compiled and edited by William C. Hartmann—*The Occult Press* ($5). This comprehensive directory and bibliography will be useful to all students of contemporary spiritualism, mysticism, mental healing and abnormal psychology.

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THE LOCOMOTIVE GOD—William Ellery Leonard—*Century* ($4). The psychological Pilgrim's Progress of a fine mind hag-ridden by machine-made ills.

Science News-Letter, December 3, 1927

ELEMENTARY SCIENCE—Gerald S. Craig—*Columbia University.* Three small paper volumes outlining the elementary science courses as given in the Horace Mann School.

Science News-Letter, December 3, 1927

BIOLOGY

NATURE RAMBLINGS

By FRANK THONE

Seagulls

Seagulls are almost always spoken and written about as a part of the romantic setting of the seacoasts, as though they can not exist apart from salt water. As a matter of fact, however, they are very frequently found hundreds of miles from the nearest ocean frontier, perfectly at home on great inland lakes, though rarely appearing on rivers.

Seagulls are one of the commonest of sights on the Great Lakes, for example, and circle and scream amid the noise and smoke of city waterfronts. Even as far west as Chicago and Milwaukee they are permanent residents, retiring to the mouths of small streams kept unfrozen by commercial pollution when ice blocks the open water in January. They appear on the Great Salt Lake in Utah, and on that highest of North American freshwater bodies, Yellowstone Lake. On these two lakes, however, they are not permanent denizens, but migrate to the ocean in winter. Some naturalists state that they go to the Gulf of California—a route which may have been established many milleniums ago, when the Pacific extended eastward much farther than it does at present.

The gulls of the Great Salt Lake are rigidly protected by Utah law; it is a crime to kill one. When the first Mormon settlers planted their first crop, hordes of crickets began to ravage the fields and starvation stared the colony in the face. When the situation appeared most desperate, clouds of white gulls suddenly appeared. Settling on the fields, they fed on the crickets, sweeping the pest away as the insects had lately threatened to sweep the crops. The devout Mormons hailed this as a direct act of Providence, and gulls have been sacred birds in Utah ever since. The finest monument on the Temple grounds in Salt Lake City was erected not to Joseph Smith nor to Brigham Young, but to the white-winged gulls of the sea.

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PHYSICS

Classics of Science: The Safety Lamp

In explaining the phenomenon responsible for the safety lamp, Sir Humphry Davy gives the following experiment, easily done in any laboratory: "If a piece of wire gauze sieve is held over a flame of a lamp or of coal gas, it prevents the flame from passing it, and the phenomenon is precisely similar to that exhibited by the wire gauze cylinders; the air passing through is found very hot, for it will convert paper into charcoal; and it is an explosive mixture, for it will inflame if a lighted taper be presented to it, but it is cooled below the explosive point by passing through wires even red hot, and being mixed with a considerable quantity of air comparatively cold."

ON THE SAFETY LAMP for Preventing Explosions in Mines, Houses Lighted by Gas, Spirit Warehouses, or Magazines in Ships, etc., with some Researches on Flame, by Sir Humphrey Davy, Bart, London, 1818.

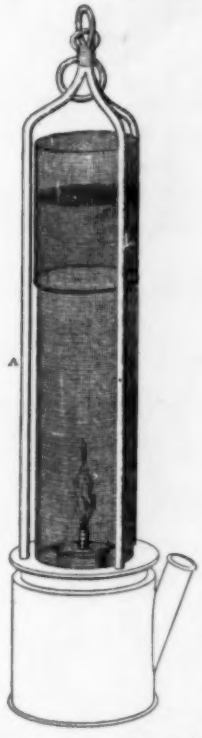
Light In Fire-Damp

In this communication I shall describe a light that will burn in any explosive mixture of fire-damp, and the light of which arises from the combustion of the fire-damp itself.

The invention consists in covering or surrounding a flame of a lamp or candle by a wire sieve; the coarsest that I have tried with perfect safety contained 625 apertures in a square inch, and the wire was one-seventieth of an inch in thickness, the finest 6,400 apertures in a square inch, and the wire was one-two-hundred-and-fiftieth of an inch in diameter.

When a lighted lamp or candle screwed into a ring soldered to a cylinder of wire gauze, having no apertures except those of the gauze, or safe apertures, is introduced into the most explosive mixture of carburetted hydrogen and air, the cylinder becomes filled with a bright flame, and this flame continues to burn as long as the mixture is explosive. When the carburetted hydrogen is to the air as 1 to 12, the flame of the wick appears within the flame of the fire-damp, when the proportion is as high as 1 to 7, the flame of the wick disappears.

When the thickest wires are used in the gauze it becomes strongly red hot, particularly at the top, but yet no explosion takes place. The flame is brighter the larger the apertures of the gauze, and the cylinder of 625 apertures to the square inch, gives a brilliant light in a mixture of 1 part of gas from the distillation of coal and 7 parts of air. The lower part of



Sir Humphry Davy's Safe Lamp

the flame is green, the middle purple, and the upper part blue.

I have tried cylinders of 6,400 apertures to the square inch, in mixtures of oxygen and carburetted hydrogen, and even in mixtures of oxygen and hydrogen, and though the wire became intensely red hot, yet explosions never took place; the combustion was entirely limited to the interior of the lamp.

In all these experiments, there was a noise like that produced by the burning of hydrogen gas in open tubes.

These extraordinary and unexpected results lead to many enquiries, respecting the nature and communication of flame, but my object at present is only to point out their application to the use of the collier.

All that he requires to ensure security, are small wire cages to surround his candle or his lamp, which may be made for a few pence, and of which various modifications may be adopted, and the application of this discovery will not only preserve him from the fire-damp, but enable him to apply it to use, and to destroy it at the same time that [it] gives him a useful light.

Sir Humphry Davy was born in Cornwall, December 17, 1778, and died in Geneva, May 29, 1829. In 1798 he began his first scientific work as superintendent of the newly established Medical Pneumatic Institution at Bristol. In 1801, at the age of 23, he was appointed by Count Rumford to a position in the Royal Institution, and here he for many years gave those lectures for which he was so famous. Here he performed many experiments on chemical substances and the new force of electricity, and trained Michael Faraday, who carried on the work to such brilliant achievements. Davy's work on explosive mixtures of gases, resulting in the invention of the safety lamp, was performed in 1815, at the age of 37. The lamp was not patented, and Davy spent a great deal of energy getting it adopted in the mines of Great Britain, from purely humanitarian motives. The illustration reproduced here is from his book which describes the lamp and recounts many instances of its successful use under conditions which would otherwise have been disastrous.

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HYGIENE

Physics and Physiology

By G. N. Lewis

We see no limit to the interesting and useful results that will inevitably come from a further application of the methods of physics and chemistry to the physiology of animals and plants. Yet the belief that even an infinite succession of such investigations would ultimately lead to a comprehensive understanding of vital phenomena seems to be one of those illusions, like the *ignis fatuus* of the mechanistic philosophers, which blind our eyes to many interesting trails that should tempt the scientific explorer.

Perhaps our genius for unity will some time produce a science so broad as to include the behavior of a group of electrons and the behavior of a university faculty, but such a possibility seems now so remote that I for one would hesitate to guess whether this wonderful science would be more like a mechanics or like a psychology.

* * * *

We have the "nature fakers," who make animals think and act just like men, and there are the others, who regard the swarming of bees as a sort of chemical reaction. I do not know which of these two extremes to regard as the more futile, for both extrapolations go far beyond what is now justifiable. Yet the attempt to bridge this vast gulf is a legitimate aim of science.—Quotations from *The Anatomy of Science—Yale University Press.*

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